Rio Tabasara Pedestrian Bridge

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Outline

- Site Visit
- Community Background
- Data Collection
- Design
  - Assumptions
  - Details
  - Alternate Considerations
- Cost Estimate
- Construction Schedule
- Looking Forward
Site Visit

- Traveled to Vigui
  - 7 hour duration
- Took a Chiva to Llano Nopo
  - 1 hour duration
- Hiked to Llano Miranda
  - 1.5 hour duration
- Hosted by Peace Corps Volunteer
Site Visit
Site Visit

- Scoped out potential locations for the bridge
  - Accessibility
  - Flood Areas
- Community Meeting
  - Needs
  - Ideas
- Tour from Ubaldo
Community Background

- Very few jobs within the Comarca
- Many men live in a bigger city during the week
- Problems with HIV and Dysentery
- No electricity, running water, or latrines
- First Peace Corps Volunteer on-site
Data Collection

- Surveying
- Soil Analysis
- Flow Rate
- Preliminary Calculations
- Design Decisions
Data Collection

Approximate Watershed Drainage Area:
24,840 hectares

Surveyed Points: Plan View
Llano Ñopo

- Developed City 2 hours away
- Hospital
- School
- Markets
- Electricity
- Bridge
**Llano Ñopo**

**Llano Ñopo Suspension Bridge**

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Measurement</th>
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<tbody>
<tr>
<td>Length</td>
<td>277.5 ft.</td>
</tr>
<tr>
<td>Width</td>
<td>6.0 ft.</td>
</tr>
<tr>
<td>Deck to Water Level</td>
<td>37.3 ft.</td>
</tr>
<tr>
<td>Bottom of Cable Sag to Water Level</td>
<td>40.8 ft.</td>
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<tr>
<td>Cable Sag</td>
<td>15 ft.</td>
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<tr>
<td>Cable Diameter</td>
<td>1.25 in.</td>
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</table>
Preliminary Design

- Needs
  - Carry children to school
  - May carry animals
  - Minimum span ~270 ft
  - Survive river flooding

- Design Choices
  - Suspension bridge
  - Ramps to raise bridge above floodplain
  - 4 feet wide to allow people to pass
  - Design for animal hoof-loads
  - Consider 100 mph wind load
Alternate Designs

- Three-cable bridge considered
- Still must stay above the water
- Dangerous for children
- Ramps would be too large
- Considering safety and cost, better to build suspension bridge

Photo Credit: Cameron Speirs
Overall Design

- 270 foot span
- 25 foot cable sag
- 5 foot hanger spacing
- 10 foot freeboard (height above water)
Superstructure Design

- Designed for 65 lb/ft² or 500lb at any point
- Minimum of 3/8” steel for corrosion and wear

- Decking: 4x12 native wood planks
- Cables: 1 5/8” 6x25 Galvanized Wire Rope
- Towers: 30’ Tall 14x0.375 Round HSS
- Cables and hangers designed with large factor of safety, preventing progressive failure
Tower Foundation Design

- Uncertainty in exact soil properties
  - Not able to conduct detailed soil tests
- Designed for approximate worst-case clay
- Large factors of safety used
- Large mat foundations for towers: 6x12 feet
- 14” Thick Reinforced Concrete
Anchor Block Design

- Deep concrete anchor blocks for cables
  - 6x10x12 feet, deep to resist sliding
  - Embedded steel beam to connect to cable
  - Skin reinforcement to control cracking
  - Entirely embedded in the ground
## Cost Estimation

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Cost (USD)</th>
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<tbody>
<tr>
<td>Materials</td>
<td>115,929</td>
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<tr>
<td>Labor</td>
<td>14,480</td>
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<tr>
<td>Equipment</td>
<td>36,668</td>
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<td>General Requirements</td>
<td>28,101</td>
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<tr>
<td>Profit</td>
<td>29,277</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>225,000</strong></td>
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</tbody>
</table>

### Opinion of Cost

- Materials: 52%
- Labor: 13%
- Equipment: 13%
- General Requirements: 16%
- Profit: 6%
Construction Schedule

- Construction window
  - January-April (Dry Season)
- Three month expected duration
- 8 hour work days
- 5 day work weeks
Looking Forward

- Documents to Peace Corps. Volunteer
- Ministry of Public Works
- Other forms of Funding
- Construction
Thank You!